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The Production of Propionic Acid from Pentoses by Propionibacterium pentosaceum

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THE EFFECT OF STEFFEN WASTE ON THE FERMENTATION OF PENTOSANS FROM THE CORN-STALK

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It was found that Steffen waste furnishes a suitable source of nitrogen, salts, and buffers for the growth of *Aerobacter pectinovorum* on pentosan material prepared from corn-stalks.

PHYSIOLOGICAL BEHAVIOR OF THE PROPIONIC ACID GROUP OF BACTERIA

SARA E. KENDALL AND C. H. WERKMAN

The group constitutes a number of species of bacteria producing large quantities of propionic acid from carbohydrates. The generic diagnosis of the group is: *Propionibacterium*, Orla-Jensen, 1909. Gram positive, non-sporulating non-motile short rods showing marked morphological variation in acid media or when grown under aerobic conditions; normal growth anaerobic. Cultures are catalase positive. Carbohydrates, glucosides and alcohols attacked with the production of propionic acid, acetic acid and CO_2. The species are differentiated on the basis of sugar fermentation, nitrate reduction, pigment production and morphology. A key to the species is given with a description of each.

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THE PRODUCTION OF PROPIONIC ACID FROM PENTOSES BY *PROPIONIBACTERIUM PENTOSACEUM*

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Propionibacterium pentosaceum attacks pentoses (xylose, arabinose) with the production of propionic and acetic acids. The medium employed was as follows:

Dried yeast (Harris Lab.)	10 gms.
K_2HPO_4	1 gm.
$CaCO_3$	5 gms.
Pentose (xylose or arabinose)	15 gms.
Water	750 cc.

The medium was brought to a boil, cooled and adjusted to pH 7.1 electrometrically. It was then sterilized for fifteen minutes at 20 lbs. pressure. The inoculum consisted of 25 cc. of a 10 day culture of *P. pentosaceum* in Sherman's sodium lactate medium. Incubation was at 30°C. for 10 days. The xylose employed was prepared from corn cobs by a method of acid hydrolysis. In addition to the pentoses a number of other fermentable substances were employed to furnish comparative data. Table 1 gives the results

Table I — Production of Propionic acid by P. pentosaceum

Flask No.	Fermentable Material 15 Gms.	Propionic Acid [1]	Per cent of Fermentable Material	Acetic Acid [1]	Per cent of Fermentable Material	Propionic Acid [2]	Per cent of Fermentable Material	Acetic Acid [2]	Per cent of Fermentable Material
		Gms.		Gms.		Gms.		Gms.	
1	Xylose	3.8	25.3	1.4	9.3	4.15	27.7	1.11	7.4
2	Arabinose	4.8	32.0	1.4	9.3	5.15	34.3	1.10	7.3
3	Sod. lactate	6.1	40.6	2.0	13.3	5.7	38.0	2.30	15.3
4	Dextrose	6.6	44.0	1.67	11.1	7.4	49.3	0.99	6.6
5	Starch	1.6	10.6	3.8	25.3	1.4	9.3	2.70	18.0
6	Glycerol	3.8	25.3	0.06	0.4	3.6	24.0	0.24	1.6

of one experiment. Small quantities of apparently succinic acid were found present in all cases, probably derived from the proteins. Both propionic and acetic acids are produced from the pentoses, xylose and arabinose by *P. pentosaceum*. Only propionic acid (no acetic) is produced from glycerol by this organism in significant quantity.

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